



# ANALOG MODULES, INC. (AMI) QUALITY ASSURANCE PROVISIONS

## GENERAL PROVISIONS

I. **PURPOSE:** This document establishes the Quality requirements applicable to products and materials ordered and Purchase Orders issued by Analog Modules, Inc.

### II. DEFINITIONS AND ABBREVIATIONS:

1. AMI – Analog Modules, Inc.
2. Product – The results of activities or processes. A product shall include, but not be limited to: service, hardware, software, processed material, or a combination thereof.
3. Contract – The Contract, Sub-contract, Purchase Order or other written agreement between AMI and the Supplier.
4. Supplier – The Person(s) and/or Company/ Corporation providing goods and/or services to AMI.

III. **GENERAL REQUIREMENTS:** Unless otherwise specified in the Purchase Order, all of the following general requirements apply.

1. **P.O. RECEIPT AND VERIFICATION** – The Supplier shall verify all purchase orders issued by AMI upon receipt. Any discrepancies in price, quantity, specifications, quality requirements, packaging, or delivery requirements shall be communicated to and resolved with AMI Purchasing before taking action on the Purchase Order.
2. **AMI ACCEPTANCE AT DESTINATION** – The products and materials ordered under AMI Purchase Orders are subject to final acceptance at their destination.
3. **QUALITY PROGRAM REQUIREMENTS** – The Supplier shall establish and maintain a quality system to the requirements of ISO 9001 or an equivalent AMI approved quality system. The Supplier's Quality System shall be approved prior to commencing any work and is subject to review and approval at all times by AMI. The Supplier retains full responsibility for ensuring that all products, lower-tier suppliers, supplies used or services furnished, comply with all applicable requirements or ISO 9001 or equivalent.
4. **ACCESS TO SUPPLIER'S FACILITY** – During the performance of this purchase order, your Quality Assurance or Inspection and Manufacturing process are subject to review, verification and analysis by AMI and/or Government/Customer representative. This requirement is applicable to the supplier's facilities where AMI products and services are processed as well as the Supplier's sub-tiers.
5. **CONFLICTS** – In the event of conflicts between the requirements of the Purchase Order and applicable product specifications or drawings, the Purchase Order shall govern.
6. **SUBMITTAL OF DOCUMENTATION** – Adequate records of inspections, tests and certifications shall be maintained throughout the manufacturing process by means deemed suitable by the Supplier. The information shall be supplied to AMI upon request. AMI may refuse to accept products if the Supplier fails to submit the documentations required by the Purchase Order Quality Assurance Provisions.
7. **REWORKED/REPLACED MATERIAL** - When returning previously rejected material to AMI, the supplier shall reference the rejection notice number on the shipping document, and shall state if the items have been replaced or reworked.
8. **SUPPLIER NON-CONFORMANCE APPROVAL REQUESTS**  
– Requests for any departures from drawings, specifications, or other purchase order requirements must be recorded and

submitted for consideration by AMI. Material shipped on an approved non-conformance request must be accompanied by a signed, AMI approved copy of the request.

9. **NON-CONFORMING MATERIALS CORRECTIVE ACTION** - Upon notification from the buyer that material furnished by the supplier is found discrepant upon receipt at AMI, the supplier shall promptly notify the buyer, in writing, of adequate and acceptable corrective action taken to eliminate the cause of the discrepancy. The Suppliers response shall include; (a) Root Cause of Defect, (b) Corrective Action Taken, (c) Action to Prevent Recurrence, and (d) Effectivity Point of such Corrective Action. If Government Source Inspection is a requirement on the PO, the supplier shall notify the cognizant Government Representative, so that he/she may participate in the investigation and corrective action; if they so desire.
10. **RECORDS RETENTION** - The Supplier shall maintain adequate records of all First Articles, In-process, Final Inspections, Tests, CSI/CAI part data history as imposed by PO. Inspection records shall indicate the nature and number of observations made for the number and type of deficiencies found, the quantities approved and rejected, and the nature of corrective action taken, as appropriate. The First Article Inspection reports shall include all drawing dimensions, general notes, and tolerance range along with actual measurement results, AMI may impose FAI in accordance with AS9102 latest rev. Additional clause specific detail is found within the applicable clause. This information and all supporting documentation such as raw material certifications, special processing records and certifications, manufacturing records, i.e., route sheets and travelers, shall be retained by the Supplier in accordance with the terms of the purchase order. When the Purchase Order is complete, such records shall be maintained and available to the buyer on request for a period of no less than ten (10) years from the closing of the purchase order unless stated otherwise on the PO.
11. **MERCURY FREE** - The use of mercury bearing instruments or equipment is prohibited during the fabrication assembly, testing or any phase of manufacture of any material furnished to AMI.
12. **CONFLICT MINERALS POLICY** –
  - a. On August 22, 2012, the final rule regarding sourcing of conflict minerals under Section 1502 of the Dodd-Frank Wall Street Reform and Consumer Protection Act ("the Dodd-Frank Act") was approved by the U.S. Securities and Exchange Commission ("SEC"). The rule imposes reporting requirements on publicly-traded companies relating to the presence of conflict minerals in the products that they manufacture. For more information on this regulation, visit <http://www.sec.gov/news/press/2012/2012-163.htm>. Section 1502 of the Dodd-Frank Act designates Tin (Sn), Tungsten (W), Tantalum (Ta), and Gold (Au) as "conflict minerals."
  - b. The SEC's conflict mineral rule focuses on the Democratic Republic of the Congo ("DRC") and adjoining countries (referred to as "Covered Countries"). Publicly traded companies are now required by the SEC to disclose annually whether conflict minerals necessary to the functionality or production of products they manufacture or contract to manufacture are "DRC conflict free." According to the SEC's final rule, this means that any conflict minerals used in manufactured products that originated from the DRC, and adjoining countries (the "Covered Countries") did not directly or indirectly finance or benefit armed groups within these countries.



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c. The SEC's final rule on conflict minerals applies to AMI suppliers of products and materials that are incorporated into AMI's products, regardless of where the supplier is located. AMI encourages our suppliers to:

- responsibly source conflict minerals and derivative metals from the DRC and neighboring countries in order to prevent a de facto embargo and associated worsening of economic conditions and human suffering in the region;
- develop policies and procedures toward preventing the use of conflict minerals or derivative metals sourced from mines controlled by armed groups in all items supplied to AMI;

**d. AMI suppliers must document their efforts to determine the source of any conflict minerals or derivatives and should be prepared to provide AMI with evidence of the origin of any conflict minerals in products supplied to AMI.**

**13. INSPECTION SAMPLING** – Unless otherwise specified in the Purchase Order, the Supplier may use sampling procedures when tests are destructive or when quality history, inherent characteristics, statistically controlled processes or operation repeatability due to numerically controlled machines justify less than 100% inspection. Sampling plans shall be in accordance ANSI Z1.4, with the exception that lot acceptance will always be: "accept on zero, reject on one". Suppliers shall submit their sampling plan as part of the First Article Inspection package for the product delivered. Sampling plans other than ANSI Z1.4 must be approved in writing by AMI for usage on AMI products. AMI will not approve any sampling plan which permits lot acceptance with defectives in the population sample.

**14. FOREIGN OBJECT PREVENTION, DETECTION AND REMOVAL** - The supplier shall maintain a FOD (Foreign Object Damage/Debris) control program assuring work is accomplished in a manner preventing foreign objects or material from entering and remaining in deliverable items. Maintenance of the work area and control of tools, parts, and material shall preclude the risk of FOD incidents. The supplier shall document and investigate all FOD incidents assuring elimination of the root cause. The Company shall have the right to perform inspection and/or audits as a method of verification that the supplier's FOD control program is functional, documented, and effective. The supplier shall identify a FOD control person responsible for implementing FOD prevention awareness and training.

The supplier shall inspect for foreign objects/materials prior to closing inaccessible or obscured areas or compartments during assembly. Tooling, jigs, fixtures, test equipment, and handling devices shall be maintained in a state of cleanliness and repair to prevent FOD. Supplier shall provide a statement of certification that deliverable products are free of any foreign materials that could cause damage to the product or to the components/systems of which the product is a part or to which the product is attached.

**15. GOVERNMENT OR BUYER PROPERTY** - If, in connection with the performance of this purchase order, any property is furnished to Seller by AMI or by the Government, Seller shall assume the risk of, and be responsible for, any loss, theft, destruction of or damage to the property while in Seller's possession or control except to the extent that this purchase order, with the prior approval of AMI and/or Government, provides for the relief of Seller from such liability. In the absence of such approval, Seller shall return all

such property in a condition as good as when received except for reasonable wear and tear for the utilization of such property in accordance with the provisions of the prime contract. Seller shall establish and maintain a system in accordance with the provisions of FAR 52.245-1 for the control of the Government or AMI owned property. Seller shall also notify AMI if approval of its property system has been withdrawn by the Government. At all times, Buyer and the Government shall have access to Seller's facilities for the purpose of reviewing its compliance with the management of Government or AMI property related to this purchase order.

## QUALITY ASSURANCE PROVISIONS

One or more of the following Quality Assurance Provisions (QAPs) are a requirement of the contract when specified by code number in the contract.

**Q1 CERTIFICATE OF COMPLIANCE** – The supplier shall provide certification with each shipment that all quality assurance provisions and other applicable requirements have been met in accordance with the specifications stated in the item description/part number appearing on the Purchase Order. This certification shall be signed by a company officer or other designated responsible individual. The following information is required on the conformance certification.

- AMI Purchase Order Number
- Part Number and revision
- Inspection Date
- Quantity and Serial Number(s) (if applicable)
- Supplier Name
- Authorized Signature

## Q2 ELECTROSTATIC DISCHARGE SENSITIVE (ESDS)

**PRODUCTS** – This product is considered to be susceptible to electrostatic discharge. The Supplier is responsible for ensuring that the product is manufactured, tested, identified and handled in accordance with MIL-STD-1686, MIL-HDBK- 263 or equivalent and shall include procedures, personnel training records and calibration of ESDS testing equipment. The Supplier's ESDS program is subject to review by AMI.

**Q3 SERIALIZATION** – Each product furnished on this Purchase Order shall be identified by a unique serial number. When specific serial numbers are required, they shall be identified by AMI.

**Q4 PACKAGING** – Unless otherwise specified, packaging shall be adequate to ensure safe delivery to destination. QAP Q2 applies to ESDS materials.

**Q4A PACKAGING OF DETECTOR DIE** – Place one part (or more) per Gel-Pack. Vacuum seal inside a metalized ESD bag with a desiccant pack and a humidity indicator card.

**Q5 SOURCE INSPECTION** – a) AMI will perform Final Inspection and/or witness acceptance tests at the Supplier's facility prior to shipment of product under this PO. The Supplier will notify AMI Purchasing and/or Quality Assurance at least 5 working days in advance of proposed ship date to schedule/confirm the quality verification. Evidence of the completed inspection must be sent with the



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shipping documents of each shipment. Supplier is required to provide reasonable access for the AMI Source Inspector(s) to any drawings, documents, and inspection equipment at any point in the manufacturing process. AMI will notify the Supplier if or when Source Inspection can be adapted or is no longer required.

b) As required, AMI Quality Assurance will contact Supplier upon receipt of order to arrange a pre-production review of the procurement package.

c) Supplier will establish a procurement package containing: PO and change notices, current configuration of drawings, supplemental documents, current specifications, data items (i.e. ATP), Qualification test approval letter and FAI approval.

**Q6 SUBCONTRACTING** – This Purchase Order may not be sub- contracted by the Supplier without written approval from AMI.

**Q6.1 SUB-TIER CONTROL** – With subcontracting approval from AMI, the supplier shall be responsible for flow down of all the requirements and provisions of the AMI purchase order applicable to the supplier's sub-contractors. Additionally, the supplier shall comply with special processes requirements when imposed.

### **Q7 SOLDERING AND WORKMANSHIP –**

**Q7.1** IPC-A-610, Class 2, Acceptability of Electronic Assemblies AND J-STD-001

**Q7.2** IPC-A-610, Class 3, Acceptability of Electronic Assemblies AND J-STD-001

**Q7.3** IPC-A-610, Class 3 with the modifications listed below (Note: these sub-notes are NOT intended to apply to Component Parts or Component Assemblies subject to soldering at a higher level of assembly where reflow could take place. It is understood that High Temperature Solders are appropriate and required to prevent solder reflow at a higher level of assembly).

Solder alloys such as Sn60Pb40, Sn62Pb36Ag2, and Sn63Pb37, shall be in accordance with J-STD-006. Other solder alloys shall not be used for electrical and electronic assembly soldering unless otherwise specified on the drawing or purchase order. (Reference J-STD-001 Para. 3.2)

Process Validation and control cannot be substituted for 100% X-Ray inspection of Ball Grid Arrays (BGAs) and Bottom Terminated Components (BTCs) (Reference J-STD-001 Para. 7.5.14 and 7.5.15).

When NiPdAu (nickel / palladium / gold) is used as a surface finish where the gold is applied either through electroless or electrolytic processes resulting in over 8 micro inches of gold, there shall be objective evidence, available for review, that there are no gold related solder embrittlement issues (Reference IPC J-STD- 001, Paragraph 4.5).

**Q7.4** IPC/WHMA-A-620, Requirements and Acceptance for Cable and Wire Harness Assemblies

**Q8 FIRST ARTICLE INSPECTION (SUPPLIER)** – Compliance to requirements must be demonstrated by submitting a first article inspection report with the first lot shipment of product and with the first lot shipment of each subsequent revision. First Article Inspection (FAI) reports must include serial numbers (when applicable), all dimensions, general notes, tolerance ranges, actual

measurements, and where physical testing is required the results of the tests. First article units must be identified as "First Article" by tagging, special packaging, or other suitable means of identification. AMI requires suppliers to deliver First Article Inspection Reports in accordance with SAE AS9102 forms for First Article Inspection Requirements (latest revision). The FAI Report must include:

1. A listing of measuring equipment and/or tooling with identification (ie. Asset No.) used as method of inspection.
2. An indication of the person (i.e. signature or stamp) who conducted the FAI inspection. Inspector must also legibly print name and title next to signature or stamp.
3. The sampling plan for the product delivered.

Additional first article inspection shall be performed when:

1. Either new manufacturing processes or new methods are used that could affect compliance to drawing requirements; or,
2. New, reworked or transferred tooling is used; or,
3. A drawing revision effects the operation(s) performed by the supplier.
4. Production stoppage greater than six months.
5. The name or location of the supplier has changed.

**Q9 CALIBRATION SYSTEM** – The Supplier's calibration system for measuring and test equipment shall be in accordance with the requirements of ISO10012, ANSI-NCSL Z540-1-1994 or equivalent approved calibration system. The Supplier retains full responsibility for ensuring that all products, lower-tier suppliers, supplies used, and services furnished comply with all calibration requirements.

**Q10 SHELF LIFE** – Materials such as paints, glues, adhesives, fluxes and similar age sensitive material shall arrive at AMI with at least 75% of shelf life remaining. Shelf life expiration information shall be identified on the product container or the shipping documents. Chemicals shall be shipped with the MSDS sheets.

**Q11 UNAUTHORIZED REPAIRS** – Supplier shall not repair products or materials found to be faulty during fabrication unless authorized in writing by AMI.

**Q12 NOTIFICATION OF CHANGE** – The Supplier shall not change the process, design, fabrication, testing, facilities, material or drawing requirements without receiving prior written approval from AMI. The Supplier shall allow AMI an opportunity to review such changes to the contractual QA provisions, including any approvals.

**Q13 AUTHORIZED DISTRIBUTION** – AMI is committed to eliminating the entry of counterfeit material into our product by using factory-direct or their authorized distributors as approved vendors for material procurement only. Only new and authentic materials are to be used in products delivered to Buyer. No counterfeit or suspect counterfeit parts are to be contained within the delivered product. Parts shall be purchased directly from the OCMs/OEMs, or through the OCM/OEMs Franchised Distributor. Documentation must be available that authenticates traceability to the applicable OCM/OEM. Independent Distributors (Brokers) shall not be used without written consent from the Buyer. Material in this requirement refers to material, parts, assemblies and other procured items as defined in SAE AS6174. Electronic parts are defined in SAE AS5553.

**Q14 CLEANLINESS ACCEPTABILITY REQUIREMENTS** – Requirements for electronic assemblies is C22 unless



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otherwise specified. C22 Test Reports for individual assemblies need not be recorded or submitted unless required by the PO. C22 Results need to be maintained at the supplier facility per AMI's General Provisions paragraph 10. (Record Retention).

CXX- First digit - surface to be cleaned, Second digit identifies testing requirements

CXX First digit

0 No surface to be cleaned

1 One side (solder side) to be cleaned

2 Both sides to be

cleaned CXX Second digit

0 No test required

1 Test for ionic residues-IPC-TM-650 TM 2.3.27

2 Test for ionic residues-IPC-TM-650 TM 2.3.25 and 2.3.25c

3 Test for surface insulation resistance - Documented procedure

4 Test for other surface organic contaminants – IPC-TM-650 TM 2.3.39

5 Other test as defined by the user/mfr agreement

**Q15 FEDERAL ACQUISITION REGULATIONS** – The following clauses set forth in the FAR/DFARS as in effect on the date of this purchase order are incorporated herein by reference. Where necessary to make the clauses applicable to this purchase order, “Contractor” shall mean “Seller,” “Contracting Officer” shall mean “Buyer,” and the “Government” shall mean “Buyer” or the “Government” whenever appearing in the clauses, unless otherwise noted. Seller shall include the following clauses in its lower-tier purchase orders as required. If any of the following FAR or DFARS clauses do not apply to a particular purchase order, such clauses are considered to be self-deleting.

**a) All Orders:**

52.203-3 Gratuities

52.203-15 Whistleblower Protections Under the American Recovery and Reinvestment Act of 2009 (applicable if funded in whole or in part with Recovery Act funds)

52.211-15 Defense Priority and Allocation Requirements

52.222-21 Prohibition of Segregated Facilities

52.222-26 Equal Opportunity

52.222-50 Combating Trafficking in Persons

52.223-3 Hazardous Material Identification and Material Safety Data

52.225-13 Restrictions on Certain Foreign Purchases

52.245-1 Government Property (except in clauses (e)(1),(e)(2)(ii),(e)(3)(i),(f)(1)(ii), the term “Government” shall remain)

52.247-64 Preference for Privately Owned U.S.-Flag Commercial Vessels

252.204-7008 Requirements for Contracts Involving Export-Controlled Items

252.204-7012 Safeguarding Covered Defense Information and Cyber Incident Reporting

252.225-7001 Buy American Act and Balance of Payments Program. (Applies in lieu of FAR 52.225-1.)

252.225-7007 Prohibition on Acquisition of United States Munitions List Items from Communist Chinese Military Companies (applicable if Purchase Order is for item(s) covered by the United States Munitions List)

252.225-7014 Preference for Domestic Specialty Metals (JUN 2005), Alt. I (APR 2003)

252.225-7021 Trade Agreements

252.227-7015 Technical Data-Commercial Items

252.227-7037 Validation of Restrictive Markings on Technical Data

252.236-7013 Requirement for Competition Opportunity for American Steel Producers, Fabricators, and Manufacturers

252.246-7003 Notification of Potential Safety Issues

252.247-7023 Transportation of Supplies by Sea

252.247-7024 Notification of Transportation of Supplies by Sea

252.249-7002 Notification of Anticipated Contract Termination or Reduction. (Delete paragraph (d) (1) and the first five words of paragraph (d)(2).)

**b) Orders of \$3,000 and Greater – All the above clauses plus:**

52.222-54 Employment Eligibility Verification

52.223-18 Encouraging Contractor Policies to Ban Text Messaging While Driving

**c) Orders of \$10,000 and Greater – All the above clauses plus:**

52.222-36 Affirmative Action for Workers with Disabilities

52.222-40 Notification of Employee Rights under the National Labor Relations Act

**d) Orders of \$100,000 and Greater – All the above clauses plus:**

52.222-35 Equal Opportunity for Veterans

52.222-39 Notification of Employee Rights Concerning Payment of Union Dues or Fees

**e) Orders of Greater than \$150,000 – All the above clauses plus:**

52.203-12 Limitation on Payments to Influence Certain Federal Transactions

52.219-8 Utilization of Small Business Concerns

**f) Orders of \$500,000 and Greater – All the above clauses plus:**

252.226-7001 Utilization of Indian Organizations, Indian-Owned Economic Enterprises, and Native Hawaiian Small Business Concerns

**Q16 PRODUCT IMPOUNDMENT AND FINANCIAL RESPONSIBILITY** – If suspect or confirmed fraudulent/counterfeit material is furnished under a contract/purchase order, such items shall be impounded. The Seller shall promptly replace such items with items acceptable to the buyer and the seller may be liable for all costs relating to impoundment, removal, and replacement. The Buyer may turn such items over to the authority having jurisdiction for investigation and reserves the right to withhold payment for the items pending the results of the investigation. Buyer reserves all contractual rights and remedies to address grievances and detrimental impacts caused by suspect/counterfeit parts.

**Q17 NON-FRANCHISED DISTRIBUTOR MATERIEL DOCUMENTATION REQUIREMENTS** – Prior to Purchasing, the following verifications and test shall be performed on the specified materiel and submitted to the Buyer for review and approval. Testing procedures shall be performed as specified by IDEA-STD-1010, Acceptability of Electric Components Distributed in the Open Market. Inspections shall be performed using IDEA-STD-1010, (Inspection Process Checklist) as a guide. The resulting reports will be supplied for each unique code or lot code. At a minimum, the following tests should be completed. Additional tests/inspections may be required as needed.



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1. GIDEP and/or ERAI search by date code / lot code.
2. Photographs – Ref. IDEA-STD-1010, 9.1
3. Solvent Test – Ref. IDEA-STD-1010.10.3.2
4. Solderability Test (Ref.: JEDEC JESD22-B102 or equivalent)
5. Blacktop Tests (Surface Test and Scrape Test)

- A component obsolescence management service (e.g. Silicon Expert) is recommended to complete the analysis AND to provide alerts from manufacturers as the updates occur. An alternate acceptable method of complying with this requirement is for the supplier to provide the BOM to the Buyer (under NDA) for AMI to complete the analysis (for the initial and subsequent intervals, if desired).

**Q18 ROHS CERTIFICATE OF COMPLIANCE** – The supplier shall provide certification with each shipment that the product provided is Lead-Free and complies with the ROHS Directive (latest revision). ROHS certificate of compliance needs to be separate from the general Certificate of Compliance.

**Q19 TRACEABILITY** – Manufacturer's Date code and Lot Code (if applicable) must be on parts packaging and listed on Packing List

**Q20 MOISTURE SENSITIVE LEVELS** – Moisture Sensitive Levels must be reported on parts packaging per IPC-JSTD-033 Section 3.3.3.1

**Q21 PRINTED BOARD HANDLING AND STORAGE** – Supplier to ensure boards are handled, stored and packaged per IPC-1601.

**Q22 OBSOLESCENCE / END OF LIFE (EOL) CLAUSE** – Supplier shall perform an obsolescence / EOL analysis of the product / manufacturing Bill of Material (BOM). Analysis shall be performed once in the first two months of the execution of this purchase order and then at an interval not to exceed 12 months from the previous analysis. Analysis shall be done on any items added to the product / manufacturing BOM following purchase order award.

The purpose of the analysis is to categorize every item in the product BOM as follows:

- Known obsolescence / EOL concern: component(s) no longer in production by the manufacturer.
- Potential obsolescence / EOL concern: component(s) nearing the end of their life cycle. The manufacturer has plans to discontinue component(s) within the next 12 months at a minimum, and/or up to the next four years.
- Small or no obsolescence / EOL concern: verified by the component(s) manufacturer that component(s) will be available for the next 12 months at a minimum.

Supplier shall provide options and recommendations to obsolescence / EOL issues to the Subcontract point of contact.

Supplier to deliver the following data for information as required by this quality note:

- o Analysis of the product / manufacturing BOM will be sent to the Subcontract point of contact.
- o Supplier will report known, potential, small or no obsolescence / EOL components to the Subcontract point of contact.

## NOTES

- The expected output of the analysis is a report or matrix that describes the obsolescence / EOL detail of each item in the BOM categorized as described above. The resolution of obsolescence / EOL issues may include the one-time purchase of all EOL type material, the qualification of an alternate supplier/item, and/or a re-design of effected circuit/subassembly.